Space Weather Forecast

Issued on Sunday, 01 January 2023 at 13:29 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of Moderate-flares throughout. Chance of Minor Geomagnetic Storm intervals form late on day 3 (3rd).

Analysis of Space Weather Activity over past 24 hours
Solar Activity: Solar activity has been Low over the past 24 hours, with frequent Common-class flares coming from a variety of sources. There are currently five numbered active regions on the visible disc, and one unnumbered, with a new region emerging round the southeast horizon over the past 24 hours. The largest and most complex region is just west of centre disc, but showed some signs of decay during the period. The next complex region is in the southwest and is moderately large, with some close spots. There are two other moderately large regions on the disc; one in the northwest and one in the northeast, but both these groups are more open. The final region is a small simple spot in the northwest which decayed through the period.
There were no obvious signs of Earth-Directed Coronal Mass Ejections (CMEs) in the available imagery during the period.

Solar Wind / Geomagnetic Activity: Solar winds were initially elevated to strong (550-650 km/s) but gradually declined to more moderately elevated levels (500-550 Km/s) later in the period. The total Interplanetary Magnetic Field was Weak throughout, with only weak fluctuations in the important north-south component. These wind parameters are indicative of a positive coronal hole fast wind connection and resulted in predominantly Quiet geomagnetic activity (Kp1-3), however an Active interval was observed 31/2100-2400 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary
Solar Activity: Low to Moderate activity is expected, with an ongoing daily chance of Moderate X-ray flares. There is a slight chance of Strong class flares occurring.

Solar Wind / Geomagnetic Activity: A CME which left the Sun on the 30th of December may cause a glancing impact at Earth either late on the 3rd Jan (Day 3) or early on the 4th Jan (Day 4). No other Earth directed CMEs are currently expected. The ongoing coronal hole influence is expected to continue today (1st Jan) then gradually decline through days 2 and 3 (2nd and 3rd Jan). A further coronal hole enhancement is expected on day 4 (4th Jan).
Quiet to Unsettled geomagnetic activity, with a chance of Active, is expected to become increasingly Quiet on day 2 (2nd). There is a chance of activity increasing to Unsettled to Active levels later on day 3 (3rd) due to a glancing blow from the CME mentioned above, but more likely on day 4 (4th) upon the arrival of coronal hole influences.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to remain at background with no solar radiation storms occurring. However, there is a slight chance of these rising in response to any larger flares that may occur, and perhaps exceeding the S1/Minor Radiation storm level.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	5	20	30
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	30	30	30	30
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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